Research Statement

My research focuses on incorporating prior knowledge within data-driven models or learning process as an inductive bias, thereby achieving efficient learning from few samples or sparse observations and making the model easier to understand for scientists and non-machine-learning experts.

Education

University of Southern California  
PhD, Computer Science  
Advisor: Prof. Yan Liu  
Aug. 2015 – Present

University of Michigan  
Master of Science, Electrical Engineering  
Advisor: Prof. Jay Guo  

Seoul National University  
Bachelor of Science, Electrical and Computer Engineering, Minor in Physics  
Graduated with honors  

Research Experience

Google Cloud AI  
Research Intern (Mentor: Sercan O. Arik)  
Sunnyvale, CA (Remote)  
May 2020 – Present

- Guide AI with rules, by utilizing a novel architecture that allows learning jointly from data and rules. The new method allows the capability of having a controllable strength of the rules at inference.

Center for Data Science (CDS) at New York University  
Visiting Researcher (Mentor: Kyunghyun Cho)  
New York, NY  

- Worked on equivariant dual graph networks for spatiotemporal prediction with missing values.

Yahoo! Research  
Research Intern (Mentor: Changwei Hu and Yifan Hu)  
New York, NY  
May 2018 - Aug. 2018

- Developed a deep structural model for analyzing and forecasting correlated multivariate time-series.

Visa Research  
Research Intern (Mentor: Jing Huang)  
Foster City, CA  

- Developed recommendation systems utilizing reviews on products based on attention CNN.

Publications

Conferences

- Karishma Sharma, Xinran He, 
  Sungyong Seo, Yan Liu, 
  Network Inference from a Mixture of Diffusion Models for Fake News Mitigation, 
  International AAAI Conference on Web and Social Media (ICWSM) 2021.

- Sungyong Seo*, Chuizheng Meng*, Yan Liu, 
  Physics-aware Difference Graph Networks for Sparsely-Observed Dynamics, 

- Changwei Hu, Yifan Hu, 
  Sungyong Seo, 
  A Deep Structural Model for Analyzing Correlated Multivariate Time Series, 

- Ashok Deb, Anuja Majmundar, 
  Sungyong Seo, Akira Matsui, Rajat Tandon, Shen Yan, Jon-Patrick Allem, 
  Emilio Ferrara, 
  Social Bots for Online Public Health Interventions, 
  IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM) 2018.


Sungyong Seo, Jing Huang, Hao Yang, Yan Liu, Interpretable Convolutional Neural Networks with Dual Local and Global Attention for Review Rating Prediction, *ACM Conference on Recommender Systems (RecSys) 2017*.

Workshops


Sungyong Seo, Yan Liu, Differentiable Physics-informed Graph Networks, *ICLR Workshop on Representation Learning on Graphs and Manifolds 2019*.

Sungyong Seo, Jiachen Zhang, George Ban-Weiss, Yan Liu, Data-driven Temporal Attribution Discovery of Temperature Dynamics based on Attention Networks, *International Workshop on Climate Informatics (CI) 2019*.

Sungyong Seo, Arash Mohegh, George Ban-Weiss, Yan Liu, Graph Convolutional Autoencoder with Recurrent Neural Networks for Spatiotemporal Forecasting, *International Workshop on Climate Informatics (CI) 2017*.


Academic Services


Computer Skills

**Programming Languages:** Python, Matlab, Javascript, C/C++  
**Deep learning tools:** PyTorch, Tensorflow, PyTorch Geometric, Deep Graph Library (DGL)

Honors and Awards

<table>
<thead>
<tr>
<th>Award</th>
<th>Dates</th>
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<tbody>
<tr>
<td>ICLR Travel Award</td>
<td>2018, 2020</td>
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<tr>
<td>NIPS DLPS Workshop Travel Support</td>
<td>Dec. 2017</td>
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<tr>
<td>SIGIR Travel Award, US NSF and SIGWEB Travel Award (CIKM)</td>
<td>Nov. 2017</td>
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<tr>
<td>Travel Fellowship Award to Climate Informatics Workshop</td>
<td>Sep. 2017</td>
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<tr>
<td>USC Annenberg Graduate Fellowship</td>
<td>Aug. 2015 - Dec. 2019</td>
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<tr>
<td>National Science and Technology Scholarship</td>
<td>Mar. 2005 - Dec. 2010</td>
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